

A. General

(USA) version of engine 617.912 is provided with exhaust gas recycling (EGR) starting model year 1980 for California and starting model year 1981 for federal and California version.

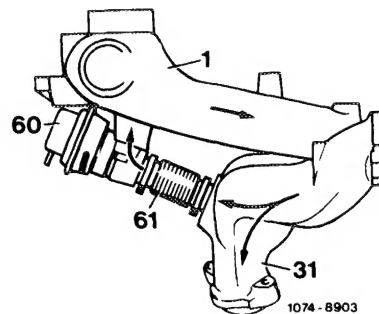
Some of the exhaust gases from the exhaust manifold are returned via a valve to the intake pipe, to reduce the proportion of nitric oxides contained in the exhaust gases.

The quantity recycled through the intake pipe is vacuum-controlled via the accelerator pedal (as a function of the load) and stopped under certain driving conditions.

Exhaust gas recycling has no effect on engine performance.

Functional diagram of exhaust gas recycling

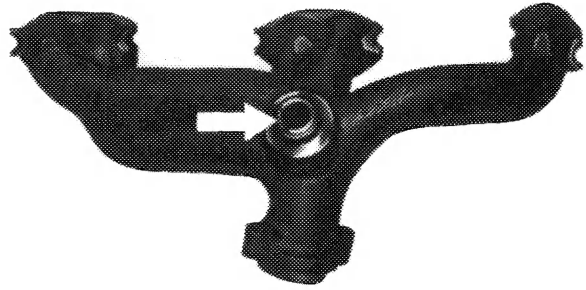
- 1 Intake pipe
- 31 Exhaust manifold
- 60 EGR valve
- 61 Bellows



B. Exhaust gas recycling components

Exhaust manifold

The exhaust manifold incorporates a pipe socket for withdrawing exhaust gases for recycling (arrow).



147-17023

Bellows

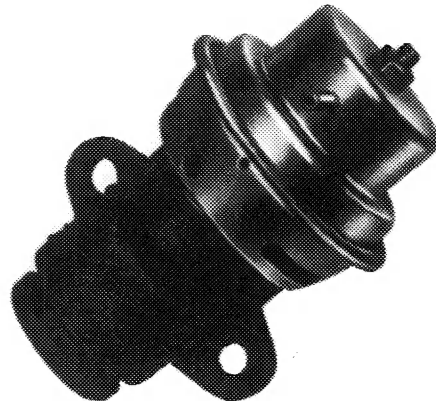
Bellows through which the exhaust gases are returned from the exhaust manifold to the EGR valve are fitted between this manifold and valve.



107-17059

EGR valve

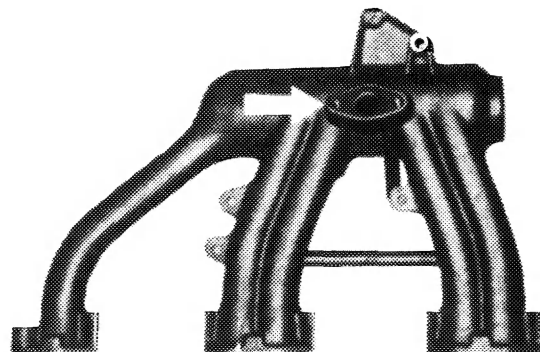
The exhaust gas recycling valve is flanged to the intake pipe. It controls emission recycling as a function of the operating conditions.



107-17019

Intake pipe

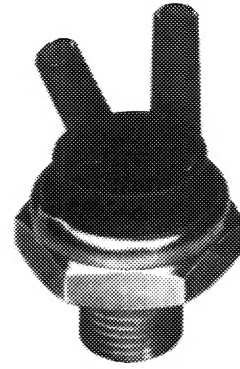
The intake pipe has a two-hole flange to hold the EGR valve. Recycled exhaust gases are divided up among the cylinders.



107-17020

Thermo-valve 17 °C (code color blue)

The thermo-valve screws into the thermostat body.
The designation "50 AB 5" is stamped in the metal part.

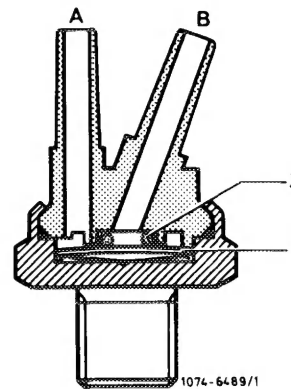


107-10895

At a coolant temperature of less than about 17 °C the bimetal plate fits against the O-ring and closes port "B".

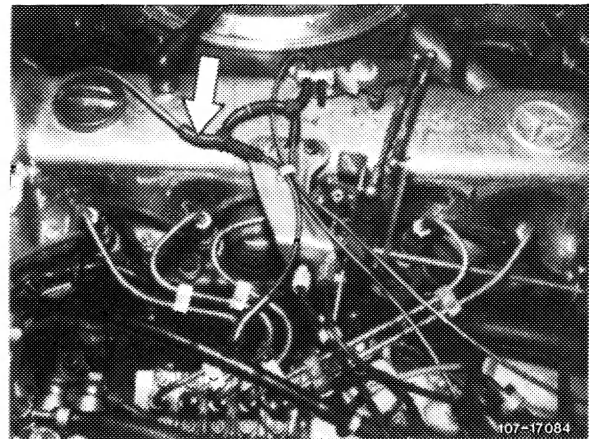
Upward of a water temperature of about 17 °C the bimetal plate springs back as a result of the temperature rise, enabling both ports to communicate.

- 1 Bimetal plate
- 2 O-ring
- A To EGR valve
- B To distributor (vacuum)



1074-6489/1

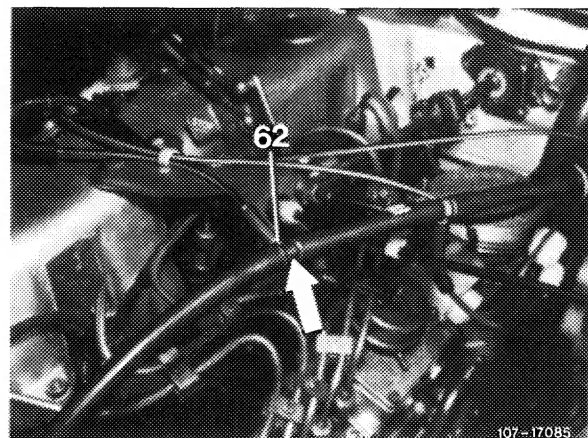
The vacuum line (white/brown) to distributor (arrow) model year 1980, to central plug model year 1981, must be plugged on connection "B", since otherwise there is no guarantee for absolute sealing between bimetallic plate and O-ring.



107-17084

Vacuum tapping point with orifice (62, code color black)

The vacuum tapping point for controlling exhaust gas recycling is located in the vacuum pipe between vacuum pump and brake booster (arrow). This point incorporates a black orifice (62) with an inside diameter of 0.6 mm (not exchangeable).



107-17085

Model year 1980

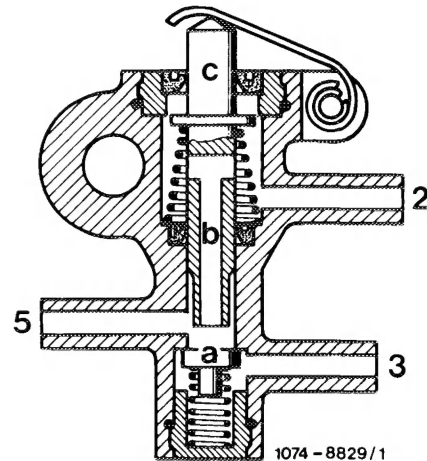
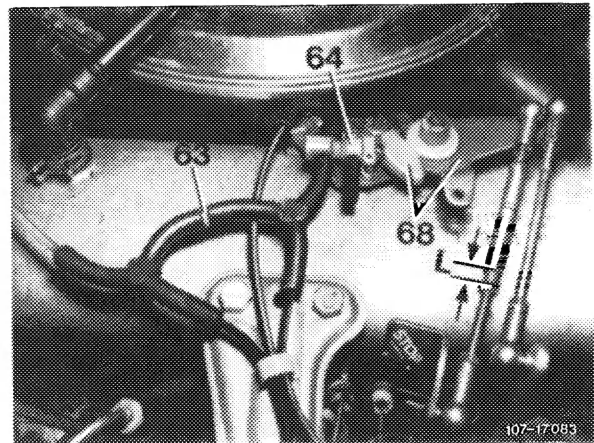
Switch-over valve (64)

The switch-over valve is cam-controlled via bell crank (68) and performs an "open-shut" function here.

At the idling position there must be no communication between 3 and 5. When, however, the control linkage is moved so far as to bridge the free movement (L) of the free movement rod the switch-over valve must open up the passage between 3 and 5 (no adjustment via idle adjuster).

Caution:

The plate and the cam track ought to be clean and **free from lubricant**. They are to be covered whenever engine is being given protective treatment.

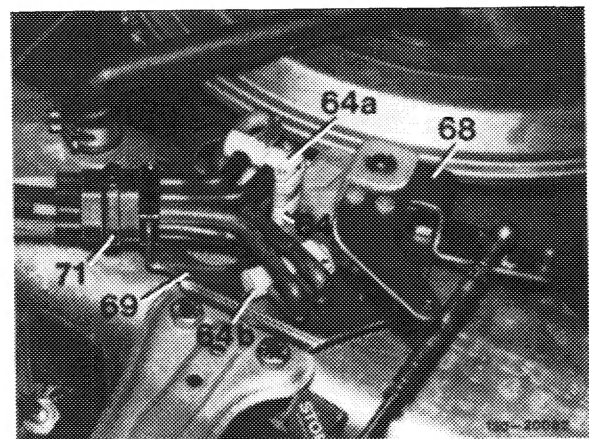


Model year 1981

Switchover valves

To control EGR and automatic transmission, 3 switchover valves (64, 64a, 64b) are mounted on a valve plate (69). Connection is by means of a central plug (71). A cap is fitted to prevent contamination of plastic running surface.

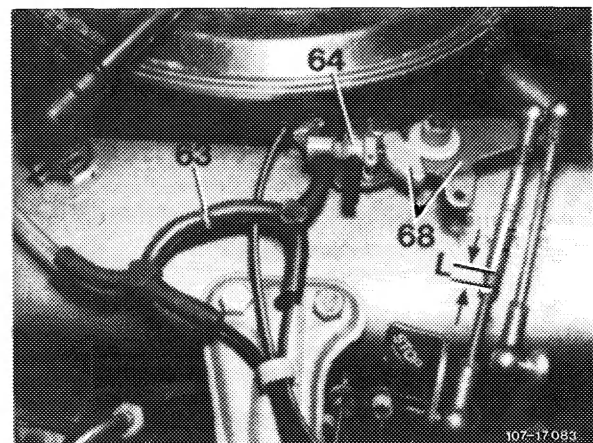
- 64 Switchover valve for automatic transmission
- 64a Switchover valve idle speed shutoff – EGR
- 64b Switchover valve full throttle shutoff – EGR
- 68 Reverse-transfer lever
- 69 Valve plate
- 71 Central plug



Orifice (63)

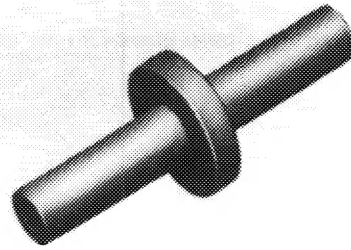
Orifices of different inside diameters are used between the two distributors at the switch-over valve.

The inside diameter of the orifice depends on the tolerances of the total adjustment angle at the control lever of the injection pump and vacuum modulating valve (65).



Orifice color coding and inside diameters

| | | | |
|-------|----------|--------|----------|
| green | = 0.7 mm | red | = 1.1 mm |
| white | = 0.8 mm | yellow | = 2.0 mm |
| blue | = 1.0 mm | | |

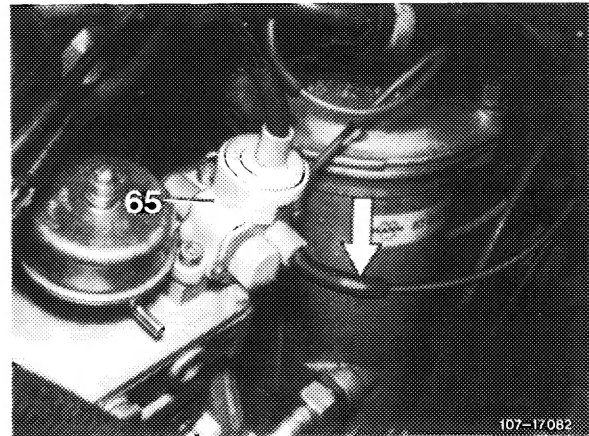


107-17058

Vacuum modulating valve (65)

The vacuum modulating valve controls the amount of air admitted through the vacuum pipe to the switch-over valve and EGR valve. The admission cross-section in the vacuum modulating valve increases with increasing load and thus decreases the vacuum step by step. All that is left just before full orifice is reached is a minor residual vacuum.

Admission is via the black plastic pipe (arrow) leading to the passenger compartment.

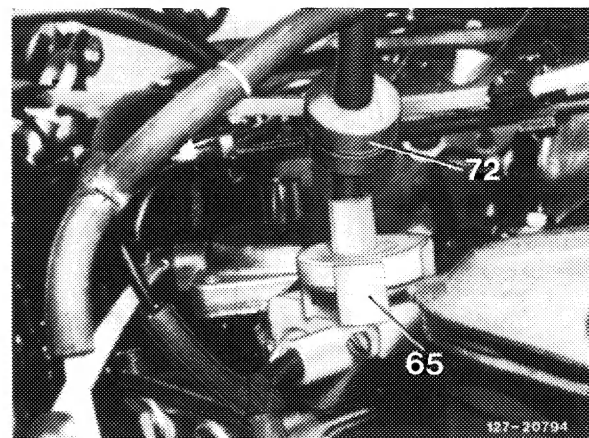


107-17082

Model year 1981

Damper (vacuum, 72)

A damper is installed in vacuum line from vacuum control valve to central plug (valve plate) to reduce high vacuum peaks.



127-20794

C. Overall function **USA** model year 1980

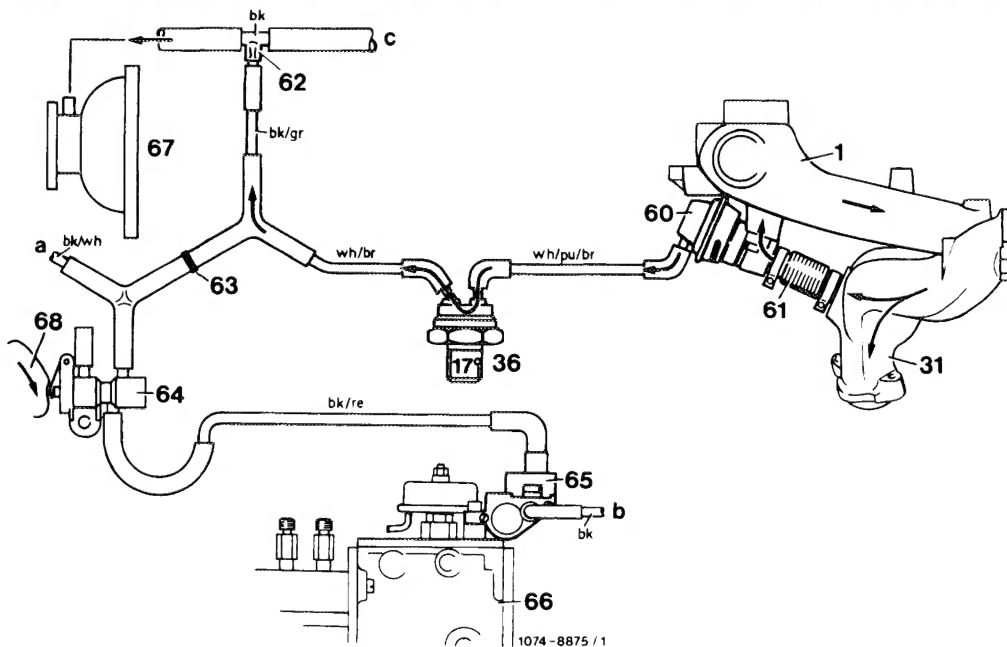
Exhaust gas recycling takes place:

- at a water temperature above 17 °C:
in neutral
in the partial-load range

The thermo-valve (36) is closed at water temperatures below about 17 °C. The vacuum cannot reach EGR valve (60) and **exhaust gas recycling cannot** take place.

The thermo-valve (36) opens at water temperatures upward of about 17 °C. The vacuum, which amounts to 700 to 800 mbar in neutral, reaches EGR valve (60), opening this wide and giving **maximum possible exhaust gas recycling**.

Vacuum development at water temperature above 17 °C, with control linkage on idle speed stop

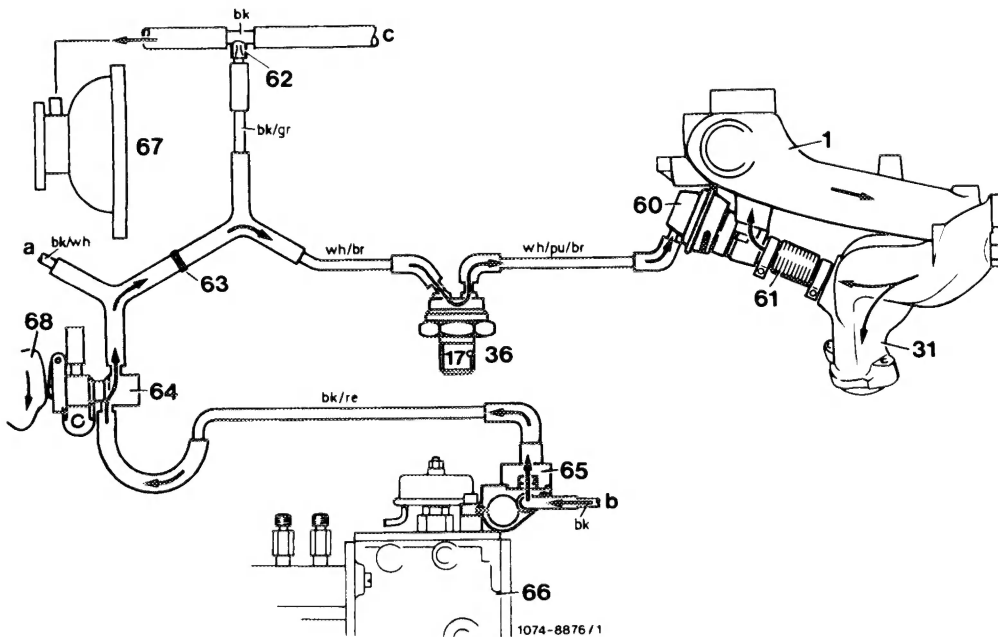


- | | | | | |
|----|--------------------|----|--|---------------|
| 1 | Intake pipe | 65 | Vacuum modulating valve | Color coding: |
| 31 | Exhaust manifold | 66 | Injection pump | bk = black |
| 36 | Thermo-valve 17 °C | 67 | Vacuum pump | br = brown |
| 60 | EGR valve | 68 | Bell crank with cam | gr = green |
| 61 | Bellows | | | pu = purple |
| 62 | Orifice | a | Automatic transmission | re = red |
| 63 | Orifice | b | Air admission to passenger compartment | wh = white |
| 64 | Switch-over valve | c | Brake booster | |

Pressing the accelerator pedal so as to bridge the free movement in the free movement rod opens switchover valve (64) via cam-controlled bell crank (68). The vacuum pipe to EGR valve (60) receives a certain amount of air via vacuum modulating valve (65). The vacuum drops to 350–450 mbar (setting off in 1st), leaving EGR valve (60) **fully open**.

As the load increases the vacuum is steadily reduced via vacuum modulating valve (65), and the amount of recycled emission diminishes. The vacuum is so low, just before full orifice is reached, that EGR valve (60) closes and **stops exhaust gas recycling**.

Air admission when switch-over valve (64) is open



- 1 Intake pipe
- 31 Exhaust manifold
- 36 Thermo-valve 17 °C
- 60 EGR valve
- 61 Bellows
- 62 Orifice
- 63 Orifice
- 64 Switch-over valve

- 65 Vacuum modulating valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Bell crank with cam
- a Automatic transmission
- b Air admission to passenger compartment
- c Brake booster

Color coding:
 bk = black
 br = brown
 gr = green
 pu = purple
 re = red
 wh = white

D. Overall function (USA) model year 1981

EGR proceeds above approx. 17 °C/63 °F coolant temperature after bypassing idle path at idle path rod in entire partial load range.

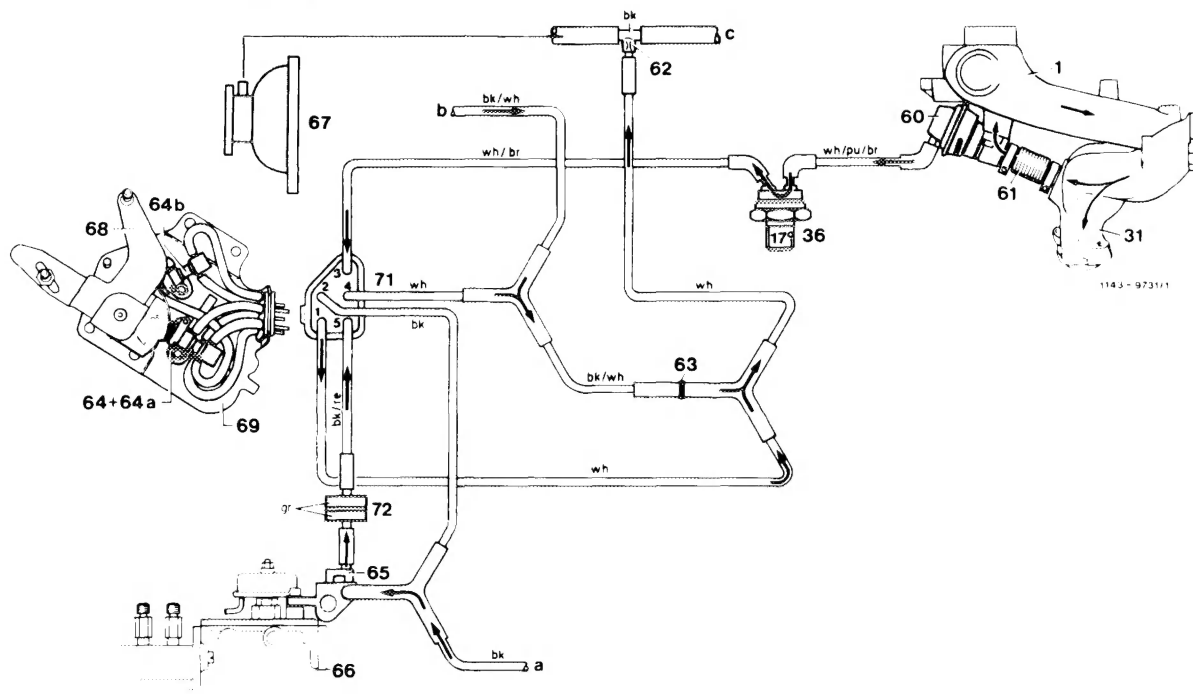
Thermo-valve (36) starts opening at a coolant temperature of approx. 17 °C/63 °F. The vacuum, 700–800 mbar at idle, is rooted to switchover valve (64a).

If the regulating linkage rests against idle speed stop, the switchover valve (64a) is switched to external venting. No vacuum arrives at EGR valve and there is consequently **no EGR**.

If the regulating linkage is actuated to the extent that the idle path at idle path rod is bridged, the switchover valve (64a) is switched over via reverse-transfer lever with cam (68). The vacuum is now rooted to EGR valve by way of the two switchover valves (64a and 64b) and opens valve completely for **max.-possible EGR**.

Note: Switchover valve (64) serves for activating transmission (moving-off in 1st gear).

Vacuum flow after bypassing idle path



- 1 Intake manifold
- 31 Exhaust manifold
- 36 Thermo-valve 17 °C/63 °F
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve automatic transmission
- 64a Switchover valve idle speed shutoff - EGR
- 64b Switchover valve full throttle shutoff - EGR

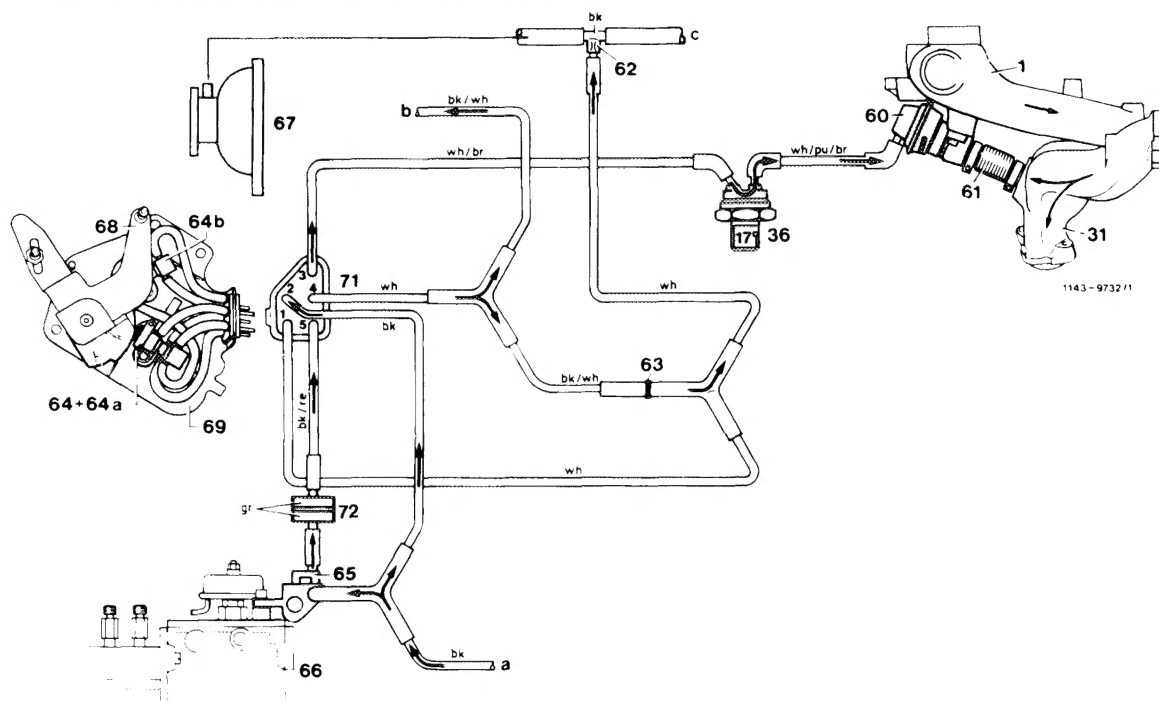
- 65 Vacuum control valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Reverse-transfer lever with cam
- 69 Valve plate
- 71 Central plug
- 72 Damper, vacuum
- a Vent to passenger compartment
- b Automatic transmission
- c Brake unit

Color code
 bk = black
 br = brown
 gr = green
 pu = purple
 re = red
 wh = white

With increasing load, the vacuum is evacuated via vacuum control valve (65). The amount of recirculated exhaust gas is getting less. Prior to full throttle position, the switchover valve (64a) is switched to external venting via reverse-transfer lever with cam (68).

The vacuum is completely evacuated, there is no more EGR.

Vent flow during operation of full throttle shutoff



- 1 Intake manifold
- 31 Exhaust manifold
- 60 Thermo-valve 17 °C/63 °F
- 60 EGR valve
- 61 Corrugated tube
- 62 Orifice
- 63 Orifice
- 64 Switchover valve automatic transmission
- 64a Switchover valve idle speed shutoff – EGR
- 64b Switchover valve full throttle shutoff – EGR

- 65 Vacuum control valve
- 66 Injection pump
- 67 Vacuum pump
- 68 Reverse-transfer lever
- 69 Valve plate
- 71 Central plug
- 72 Damper, vacuum
- a Vent to passenger compartment
- b Automatic transmission
- c Brake unit

Color code
 bk = black
 br = brown
 gr = green
 pu = purple
 re = red
 wh = white